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March 1986

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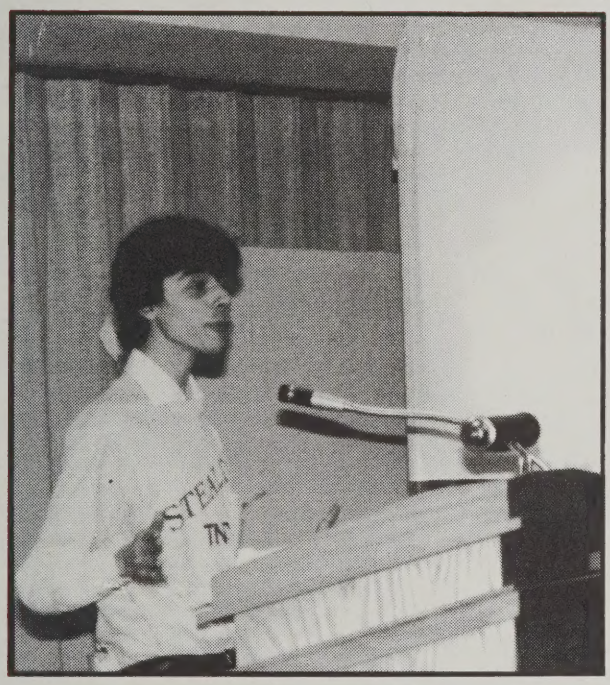
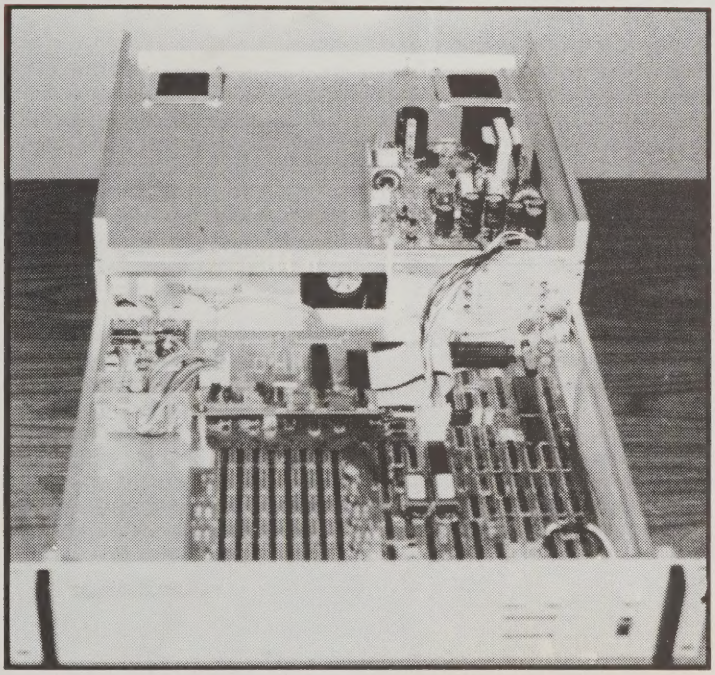
PACKET RADIO MAGAZINE

Dedicated to the Advancement of Packet Radio



Howie Goldstein, N2WX



K4GFG's 820 FAD Switch

VAPORWARE CONDENSES AT ORLANDO

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PACKET RADIO MAGAZINE

PACKET RADIO MAGAZINE is published monthly by the Florida Amateur Digital Communications Association, Inc. (FADCA), 812 Childers Loop, Brandon, FL 33511. (813) 689-3355.

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News and Views

Gwyn Reedy, W1BEL

This month's PRM is chock full of articles and pictures, so I'll keep my part short and save space for the other writers.

CORRECTION: My report last month about K4TKU and the FCC's interest in his unattended HF operation was premature. His letter from the FCC arrived after PRM went to press.

Thanks to all the people that attended the Fifth ARRL Amateur Radio Computer Networking Conference, especially those that presented papers, and above all, to Paul Rinaldo, W4RI, for his management of the Conference in less than ideal conditions.

The cover on this PRM shows Howard Goldstein, N2WX, frequent commentator about the ephemeral qualities of much software (it'll be ready next week; its 95% done, etc) presenting his paper on the level 3 switch software he has written. Both Howie's code and a Xerox 820 version of TCP/IP were demonstrated at Orlando. Also pictured is the very sanitary X820 switch put together by Tom Kneisel, K4GFG. More pictures at the centerfold.

Seen and heard at Orlando (some more tongue in cheek than others): ...Terry Fox, WB4JFI, had a prototype IBM PC card in his briefcase that acts like a TNC.....TAPR insiders were wearing 'STEALTH TNC' T-shirts. Wonder what they will unveil at Dayton this year.....Pete Eaton demonstrated a major breakthrough in packet operator training aids. Manufacturing problems may keep it from wide distribution for a while, though.....Harold Price reported that he is twice as close to version 4 software for the TNC1 as he was the last time he answered that question. He also observed that repeatedly cutting a distance in half never casuses it to reach zero.....

PRM continues to expand. Printing is up 50% this month, to 1100 copies. Several major packet clubs are getting ready to join in. FADCA has applied for a second class mailing permit. Beginning next month, your PRM should arrive more quickly and in better condition. Thanks for your patience and support as we go through this rapid growth period. FADCA is getting about 40 pieces of mail each week so it's hard to respond quickly.

Model 100 Terminal Program For GLB PK-1

Joe Buswell, KJ5B [70305,1341]

From Compuserve Information Service Data Library 9.

This is a simple terminal program for the Radio Shack Model-100 that buffers transmit text so it can be sent to a GLP PK1 at machine speed. Baud rate is 600, the maximum the M-100 can handle in Basic. This program prevents the problem of keyboard interrupts interfering with packet reception, at least it minimizes the problem.

```
1 ' PAKGLB.BA v1.0 Transmit Text buffer for GLB PK1
2 ' and RS Mod. 100. c 1984 Joe Buswell, K5JB
3 ' Permission is given to freely distribute this
4 ' program for non commercial purposes. Received
5 ' text is unbuffered. To redisplay entered text,
6 ' use Ctrl-D. Because the M-100 intercepts Ctrl-C,
7 ' disconnect with function key 8 (or ESC ESC,
8 ' followed by AD for auto disconnect). Echo is
9 ' disabled because the GLB cannot take text at
10' machine speeds while echoing. Note that fun-
11' ction key 2 transmits buffered text. Transfer
12' rate is 600 Baud. For short strings (128 char?)
13' 1200 Baud will work...enjoy, K5JB

15 CLEAR 1000:CLS:COM ON:KEY ON
20 GOSUB 800:' DISPLAY COMMANDS
30 OPEN"COM:47I1E" FOR INPUT AS 2:OPEN"COM:47I1E"
   FOR OUTPUT AS 1:'600 BAUD
40 INPUT"SETUP (Y/N)";R$:IF R$="Y" THEN GOSUB 500
50 ON KEY GOSUB 200,300,,,,,800,700:'
   EDIT,XMIT,,,,,COMMANDS,DISC
60 ON COM GOSUB 400: ' COMMUNICATION INTERRUPT
100 PRINT"YOU GOT IT!": ' INTERACTIVE MODE
110 E$=INKEY$
120 PRINT#1,E$;
130 PRINT E$;:IF E$=CHR$(13) THEN PRINT :' TIDY UP
   SCREEN
140 GOTO 110
200 PRINT"EDIT:"
210 A$=INKEY$:PRINT A$;
220 IF A$="" THEN 210
230 IF A$=CHR$(1) THEN GOSUB 300:' TRANSMIT (ALSO
   USE F-2)
240 IF A$=CHR$(4) THEN PRINT" "+B$;:' REDISPLAY WITH
   CTRL=D
250 IF A$=CHR$(27) THEN PRINT" LEAVE EDIT":RETURN :'
   ESC
260 IF A$=CHR$(13) THEN PRINT:A$=A$+" ":'THROW AWAY
   SPACE
```

Dayton Packet Forums

Tentative Plan for Dayton Hamvention packet radio forums according to Bob Neben, forum organizer. He hopes to have Room 1 on Friday April 25th with the first Forum running from 1300-1445 and the second forum running from 1500-1700.

PACKET RADIO FORUM I
Packet Radio Fundamentals and Tutorial

Bob Neben, K9BL	Introduction (5 min)
Pete Eaton, WB9FLW	Packet Fundamentals (75 min)
Jon Bloom, KE3Z	The ARRL and Packet Radio (30 m)

PACKET RADIO FORUM II
Packet Radio Technical Developments

Lyle Johnson, WA7GXD	Update on TAPR (1 hour)
Harold Price, NK6K	PACSAT Update (1 hour)

The Hamvention book listing the Forums will show the two Forums separately with their respective times. This may stop folks from leaving early, and allow oldtimers to bypass the first part and come to the more Technical talks in the second forum.

Bob is also setting up another informal get together for Saturday night. Stop by the TAPR Booth (same spot as last year) during the Hamvention for directions and time.

Updates to the FADCA Network Connectivity Matrix:

FTL - Out of Service
HWD - BCR Excellent
HWD - WPB Fair
HWD - MIA Excellent
Network test sites:
904JAX (JAX-0) (JAX is still operative as JAX-1)
904OCF (OCF)
813CLW (CLW) (KC2FF-7 is still operative)
813TPA (TPA)
305MLB (MLB)
305STU (STU)
305HWD (HWD) (temporary site)

Revise the digipeater map (Feb edition) to show the callsign of TLH as WA4DSW.

More On 85-105

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)
	)
Waiver of Section 97.80(b) and	)
97.114(b)(4) of the Amateur	)
Rules to Permit the Retransmission	)
of Third-Party Traffic in Certain	)
Situations	)

PR Docket No. 85-105
ORDER

Adopted: March 14, 1986 Released: March 14, 1986

By the Chief, Private Radio Bureau:

1. On February 28, 1986, the American Radio Relay League, Inc. (ARRL) filed a petition for Extraordinary Relief requesting the Commission to temporarily waive Sections 97.80(b) and 97.114(b)(4) of the Rules to permit amateur stations operating in a packet radio network under automatic control to retransmit third-party traffic. The requested waiver would terminate when the Commission adopts a final Order disposing of the petitions for reconsideration filed in PR Docket No. 85-105.[1] In that proceeding, the Commission authorized automatic control for stations transmitting digital communications on amateur frequencies above 50 MHz, but noted that the transmissions of third-party traffic by such stations would require the supervision of the control operator.[2]

2. The prohibition against unsupervised third-party traffic has served to ensure that amateur facilities and frequencies are not used by non-amateurs. Only a person who has demonstrated the proper qualifications may be a control operator of an amateur station. Such control operators screen any third-party traffic to prevent transmissions which are prohibited by Subpart E of the Amateur Rules.

3. Those prohibitions include, but are not limited to, business communications, secret messages, radiocommunications for unlawful purposes and radiocommunication with nations which have not assented to third-party traffic. Self-policing has long been a cornerstone in the integrity of the amateur service. The presense of the responsible licensed control operator at each station has been a vital element in the amateur self-policing tradition. But ARRL, in the instant petition and in its related petition for reconsideration in this proceeding, argues that this safeguard is neither practical nor effective in the context of packet radio technology.

3. In support of the instant petition the ARRL said that the effect of application of traditional third-party traffic control operator requirements to amateur packet radio would severely limit the development of this network for the rapid and accurate relaying of messages and data. The ARRL requested the waiver only for packet radio digital communications using, or compatible with, their AX.25 protocol.[3] The waiver requested by ARRL only relates to the retransmission of messages already properly screened; a control operator will still be required at every amateur station introducing messages into a packet radio system.

4. In view of the above, we believe a temporary waiver is in order until the Commission has evaluated the arguments presented in the subject petitions for reconsideration and issued a ruling on them. Packet radio in the Amateur Service is in the developmental stages. Although interest in this area is intense and growing, there are still only about 14,000 stations, or about 3% of those licensed, equipped for packet radio operation. Thus the risks of abuse are minimized by the small scope of packet operation which will obtain during the period of this waiver. In the interim, more experience can be gained with automatic control of stations retransmitting with the AX.25 protocol.

5. Accordingly, the waiver request of the ARRL IS GRANTED to the following extent:

(a) The provisions of section 97.80(b) and 97.114(b)(4) are waived to permit amateur stations, retransmitting digital packet radio communications (see Section 97.69) on frequencies 50 MHz and above, using the AX.25 (or compatible) protocol, to be operated under automatic control while retransmitting third-party traffic. See Section 97.3(v).

(b) This waiver applies only to the retransmission of third-party traffic originated at another amateur station which is under local control or remote control. See Section 97.3(m).

(c) When an amateur station is operated under automatic control, devices must be installed and procedures implemented which will ensure compliance with the rules, when the control operator is not present at the control point of the amateur station. See Section 97.80(a).

(d) This waiver will remain in effect until the Commission takes final action on the petitions for reconsideration filed in PR Docket 85-105.

6. Control operators of amateur stations capable of monitoring AX.25 packet transmissions must be alert to the increased dependency upom them for monitoring during the period of this waiver. We call upon them to immediately make known to the responsible control operator of a station retransmitting communications under automatic control any misuse of the station so that the control operator can take prompt corrective action.

[Signed]
Robert S. Foosaner
Chief, Private Radio Bureau

[1] Report and Order in PR Docket No. 85-105, adopted January 13, 1986; FCC 86-18; 51 Fed. Reg. 3069, January 23, 1986.
[2] See Sections 97.69(d) and 97.114(b)(4) of the Amateur Rules.
[3] See AX.25 "Amateur Packet Radio Link-Layer Protocol": Version 2.0, Copyright 1984 by the American Radio Relay League; October 1984.

*****

Alanet Notes

Jim S. Griffith, WA5RAX

The second meeting of Alabama packeteers was held at Alabama State University on January 25. Over 40 amateurs were present. In summary the following activites occurred:

The name "ALA-NET" was adopted for the Alabama State Packet Organization. It was agreed that Alabama would be divided into four major east-west LANs. Each LAN has a Director and a Vice Director to represent them. WD4CPF was chosen as the at-large director. Five members of Ala-Net were chosen to coordinate digipeaters and BBSs and interface to the Alabama Repeater Council for freqeuency coordination. The frequencies of 145.07 and 145.67 were established as the frequencies to be used by the four LANs that cover the state with all local traffic moving off of 145.01.

The four areas are as follows:
The Northern East-West LAN will operate on 145.07 mhz and is made of Cherokee, Colbert, De Kalb, Etowah, Franklin, Jackson, Lauderdale, Lawrence, Limestone, Madison, Marshall, and Morgan counties. W4HFU Director, WB4ZKX Vice-Director.

The Central East-West LAN will operate on 145.67 mhz and is made of Bibb, Blount, Calhoun, Clay, Cleburne, Cullman, Fayette, Jefferson, Lamar, Marion, Pickens, Randolph, Shelby, St. Clair, Talladega, Tuscaloosa, Walker, and Winston counties. K4HAL Director, WA5RAX Vice-Director.

The Capital East-West LAN will operate on 145.07 mhz and is made of Autauga, Bullock, Chambers, Chilton, Choctaw, Coosa, Dallas, Elmore, Greene, Hale, Lee, Lowndes, Macon, Montgomeryx, Morenga, Perry, Russell, Sumter, Tallapoosa, and Wilcox counties. N4HY Director, WB4OZN Vice-Director.

The Southern East-West LAN will operate on 145.67 mhz and is made of Baldwin, Barbour, Butler, Clarke, Coffee, Conecuh, Covington, Crenshaw, Dale, Escambia, Henry, Geneva, Houston, Mobile, Monroe, Pike, and Washington counties. N4JAG Director , WB4RHO Vice-Director.

Hence, we have four LAN areas with each one containing a major Alabama metropolitan area. Sub-LAN frequencies have also been coordinated. To complete the grid a high speed 448.4 link is being established on a north/south basis throughout Alabama with its main emphasis being to connect the BBSs. A recent donation of Boeing 25 watt model 700 digital transceivers to the Huntsville Amateur Radio Club are being used for this purpose. David, N4KTY, and others in the Huntsville Club have developed step by step modifications for these transceivers to handle 9600 baud. Coordinated sites have been chosen and approvals given for establishing these units at key interstate boundaries as well as tall towers throughout the state. Most LANs are now in the process of performing the needed modifications on their units with the 448 mhz link expected to be completed by early summer. Many of the two port 820 devices are being replaced with the new TNC-2 two port units.

One of the next ALA-NET meetings is being scheduled for the Birmingham Hamfest in early May. See you all there.

*****

The following is forwarded from the W3IWI BBS:

- -

FCC 85-105:Important news

The FCC Report and Order 85-105 has been the source of considerable concern to the packet radio community. This action, which was to take effect this weekend, would have required a control operator would have required a control operator to be present whenever 3rd party was being handled. Since the definition of 3rd party traffic is very specific, this could have been interpreted as prohibiting essentially all packet radio activity. In addition to petitions for reconsideration filed by many individuals and organizations, on Feb.28 the ARRL filed a petition for "Extraordinary Relief" to hold the FCC actions in abeyance until the petitions for reconsideration are considered.

- -

From W1AW via OBS W2JUP Farmingville NY 3/14/86---1830EST
QST DE W1AW
HR ARRL BULLETIN NR 19 FROM ARRL HEADQUARTERS NEWINGTON CT MARCH 14, 1986
TO ALL RADIO AMATEURS BT

VHF PACKET RADIO GOT A BIG BOOST TODAY. AT ARRL REQUEST, THE FCC SUSPENDED PARTS OF ITS RULES TO PERMIT THIRD PARTY TRAFFIC BY PACKET STATIONS UNDER AUTOMATIC CONTROL. SEVERAL CONDITIONS ARE ATTACHED TO THE WAIVER, PROVISIONS OF SEC 97.80(b) AND 97.114(b)(4), WHICH WERE BOTH TO BE ADDED TO THE RULES MARCH 14, ARE WAIVED TO PERMIT AMATEUR STATIONS RETRANSMITTING DIGITAL PACKET RADIO COMMUNICATIONS ON 50 MHZ AND HIGHER BANDS USING AX.25 OR COMPATIBLE PROTOCOL TO BE OPERATED UNDER AUTOMATIC CONTROL WHILE RETRANSMITTING THIRD PARTY TRAFFIC. THIS WAIVER APPLIES ONLY TO THE RETRANSMISSION OF THIRD PARTY TRAFFIC ORIGINATED AT ANOTHER AMATEUR STATION WHICH IS UNDER LOCAL OR REMOTE CONTROL. WHEN AN AMATEUR STATION IS OPERATED UNDER AUTOMATIC CONTROL, DEVICES MUST BE INSTALLED AND PROCEDURES MUST BE IMPLEMENTED WHICH WILL ENSURE COMPLIANCE WITH THE RULES WHEN THE CONTROL OPERATOR IS NOT PRESENT AT THE CONTROL POINT OF THE AMATEUR STATION. THIS WAIVER WILL REMAIN IN EFFECT UNTIL THE COMMISSION TAKES FINAL ACTION ON THE PETITIONS FOR RECONSIDERATION FILED IN PR DOCKET 85-105. AMATEUR PACKET OPERATORS MUST BE ALERT TO THE INCREASED DEPENDENCY UPON THEM FOR MONITORING DURING THE PERIOD OF THIS WAIVER. THEY SHOULD IMMEDIATELY MAKE KNOWN TO THE RESPONSIBLE CONTROL OPERTFR OF AN AUTOMATIC PACKET STATION ANY MISUSE OF HIS STATION SO THE LICENSEE CAN TAKE CORRECTIVE ACTION. IN SUMMARY, VHF PACKET RADIO MAY CONTINUE UNDER AUTOMATIC CONTROL AR

- -

Cactus Corner

de WA7GXD

BEWARE THE IDES OF MARCH!

Unlike a fellow named Julius, the Ides of March bode well for Amateur packet radio. The Fifth ARRL Computer Networking Conference, in Orlando, Florida, was a very positive and significant event. At that meeting, AX25 Level Three was demonstrated on some TNC 2s (using software developed by Howie Goldstein, N2WX). Not to be outdone, the datagram crew demonstrated TCP/IP running on various machines including a Xerox (tm) 820.

Why is this significant? Because networking is the next logical step in the evolution of Amateur packet radio, and these two groups demonstrated that networking is upon us in a very real sense.

Why do we need networking? If you live in a crowded area (as far as packet activity is concerned), you have probably experienced the frustration of trying to use 145.01 MHz in the early evening, especially if you need to use a digipeater or two. The problem with digipeaters is that they are an extension of level two, and as such require an end-to-end acknowledgment. A level three system, on the other hand, will use point-to-point acknowledgments.

What this means is simply that, if you send a packet to a distant station via one (or more) relaying stations, and if the channel is not perfect, your data will get to its destination quicker if networking is in place. Contrast this to the present situation where a crowded channel can be rendered almost completely useless if digipeaters are needed to complete the desired connection or path.

THE TAPR NNC - AN UPDATE

The Network Node Controller (NNC) is a specialized piece of computer hardware designed to help advance the pace of network development and implementation. See previous columns and articles in Packet Radio Magazine for a description of this device.

Last month I promised you an update of NNC development activity -- here it is!

The hardware has been verified, corrections made to the main printed circuit board (PCB), and a prototype PCB reflecting the changes is undergoing construction as I write this. The floppy disk controller PCB has been constructed and tested (it works!). The modem PCB has been constructed and the artwork for the next version of the PCB is being generated (it didn't work...).

Naturally, the digital hardware is only part of the story. In fact, surprising as it may seem, the software that I hope will soon be running on the NNC is also only a part of the story. The third part, in some ways eclipsing everything else, involves radios. In our world of packet communications, modems may be a more correct term.

It is a relatively easy matter to generate a stream of bits in a computer. We do it all the time with our existing TNCs. Networking software, embryonic though it may be, exists and is being refined. The NNC project, with digital hardware to be shipped to the initial "Alpha" software developers about the time this appears in print, will help act as a focal point to spur the software effort onward.

But you can only send so much data at 1200 bits per second (bps). And even less at 300 bps on HF. The NNC modem board has three 1200 bps ports and one 300 bps port (which can be reconfigured to 1200 bps). While multiports will certainly help ease channel congestion, these are still abysmally slow ports.

Recognizing this, TAPR has underway a radio design effort to produce a 9600 bps radio as well as a 56 kbps (kilo bps) radio to operate in the 220 MHz band. The TAPR Board of Directors approved initial funding of $1,000 to aid in this effort, headed up by Steve Goode, K9NG.

In addition, there are ongoing negotiations with a satellite communications company to license certain advanced modem technology for Amateur packet use. If everything works out, narrowband "good neighbor" modems with excellent weak-signal performance may emerge in several months' time.

THE HIGH FRONTIER

Sometime in August of this year, a Japanese Amateur satellite, known as JAS-1, should achieve orbit. If all goes well, a few months after launch an on-board packet bulletin board system (PBBS) will be made available to earthbound packeteers.

This PBBS will operate on what is known to the satellite fraternity as Mode J (specifically, Mode J-D). This means that the uplink to the satellite will occur on 2 meters (145 MHz) and the downlink from the satellite will be transmitted on 70 cm (435 Mhz). Mode J is so-named because of the Japanese-built transponder that flew on AMSAT/OSCAR-8 back in 1978 which first used this frequency scheme in Amateur satellites.

There will be four 2 meter channels running at 1200 baud in a Manchester FM format and a single downlink channel on 70 cm running PSK NRZI. Say what?

In order to simplify the spacecraft design, Manchester format was selected for the uplink channels. This is different than the NRZI format that most Amateur packet activity uses.

The downlink is a different matter. PSK is more energy efficient than FM for data transmission, and power on a satellite is definitely at a premium.

So how do I use this satellite? you might be thinking. That is a question we will answer next month! We will also provide you with some information on RUDAK, a high-flying digipeater...

Until then, happy packeting!

PS - if you are at Dayton in April, be sure to stop by and see us at the TAPR booth!

*****

FADCA > BEACON
THE FLORIDA AMATEUR DIGITAL COMMUNICATIONS ASSOCIATION

Bytes From The Write Only Memory

Ted Huf, K4NTA

The big news around Florida this month is the new GATOR 2 Network Node Controllers that are coming on line. Howie N2WX got his on at Melbourne a couple of months ago and this over the last week three more are in service. John, W5HUQ, got 904JAX working in Jacksonville. Ernie, K4OSM, got Ocala, 9040CF on line and I got 305STU up at about the same time. Tom, K4GFG, has 305HWD in operation from a temporary location, and both 813CLW and 813TPA are running with experimental level 3 code on TNC-2 boards. These NNCs are the brainchild of Howie Goldstein, N2WX, and his collaborators in New Jersey. In case anyone does not know it by now, Howie is the author of the software for the TAPR TNC-2 which has become the industry standard TNC. Howie's GATOR 2 software runs on an Xerox 820 computer board with a FAD HDLC board.

There soon will be other GATOR 2 NNCs or switches on around Florida and other states. I know that West Palm Beach, Daytona, Clearwater, Tampa and the Sarasota folks are working on X820 hardware, and some south Georgia interest exists. N2DSY is running the code in Northern New Jersey also.

Operation of a GATOR 2 switch is not hard to learn. You use the switch by connecting with it just like you would connect with any other station. Below are some of Howie's instructions on how it use it.

The pad is activated by connecting to the switch and sending a packet.

```
cmd:CONNECT 305MLB
cmd:*** CONNECTED to 305MLB
{4          [Send a <CR> when you receive the {4.]
gator 2 pad 03100305724 port B
enter: call [, digi1 [, digi2 [, digi3] ] ]
to?
```

Now the pad needs to know who you wish to call. Enter the callsign (along with any ssid) followed by a <CR>.

```
to?N2WX-1
```

In some cases the station you want to connect with will not be within direct range of the switch. Gator 2 supports both networked calls and calls using digipeaters.

```
to?K4AHO,ORL
```

Above is an example of how to instruct the Melbourne switch to call K4AHO who lives beyond the range of the network layer (but is available via a digipeater.)

Once you've issued a callsign (and optional digipeater parameters) one of three things could happen.

1. Normally you'll get a message like:
   *** pad: connection reset

This means the call was successfully completed. It is analogous to a "*** connected" message. Another way you could get a *** pad: connection reset message if the person on the other end reconnects or somehow resets his own link.

2. You get the prompt again

```
enter: call [, digi1 [, digi2 [, digi3] ] ]
to?
```

This will happen under one of two conditions:

A - the callsign(s) entered was illegal, or
B - the person you called is already using the pad for a call with someone else. Try again later.

3. You get disconnected ("kicked off")

The person at the other end had CONOK off, was busy, or did not answer (retried out).

We are now using prototype GATOR 2 software. Some of the Level 3 functions are not yet supported. For example, a connection using Level 3 might go like this: to? K4NTA @305STU. The switches would route the packets according to a routing table through as many switches or GATOR 2 NNCs as needed to get to 305STU, but as I said, this software is still being worked on. Until the software is finished, you can instruct a switch to connect with another switch but there is a drawback. Your callsign will not get passed through the second switch. For example, if you tell 305STU to connect with 305MLB, then tell 305MLB to connect to the N2WX-1 MailBox, the MailBox will think that 305STU is the user, not you, because the *** Linked to message says 305STU. While this is a problem with automated stations, it should not be hard to handle between human operators until the software is able to handle the situation correctly.

*****

Florida Network Coordinating Committee Meeting Minutes, March 8, 1986 (condensed version)

Don Deem, KB4LLO

The fourth meeting of the NCC was conducted at the Orlando Hamfest. Participation was light. At Jim's (K4AHO) suggestion, the group formed three divisions, North Florida, West Florida, and South Florida. Much discussion centered about the lack of LAN participation, and ways to obtain support from the network users.

Continued >>>

Continued from page 7

Tom, K4GFG, discussed separation between LANs on a common frequency. Several band plans were offered, but no acceptable plan could be achieved using only the existing five frequencies on 145 MHz. A plan providing 125 mile separation, but requiring six frequencies was approved. This will require allocation of a new frequency by the Florida Repeater Council.

The group agreed that the majority of the channel clogging seen today is due to MailBoxes. It was proposed that MailBoxes and other PBBS be put on 220 MHz when such a backbone exists, and accessed via the network or locally by a two meter port. Additional suggestions are encouraged.

Recommended operating practices to reduce channel congestion and increase operating pleasure are:

O- Minimize the use of the 'bell' character,
O- Eliminate beacons from unattended stations,
O- Discourage beacons more frequent than 30 mins,
O- Move local QSOs and file transfers off of the digipeater frequency, where possible.
O- Seasoned packeteers should provide training about good practices to newcomers.

Encouraging 220 MHz construction progress was reported by many sites.

*****

FADCA Packet Frequency Coordinating Committee

Tom Kneisel, K4GFG

FADCA's PFCC met at the Orlando Hamfest, with Jim, K4AHO, Ted, K4NTA, Doug, WB4KGY, Tom, K4GFG, and new member Larry, K4OZS present. Chairman Rick, KB4CIA, resigned due to new work responsibilities. Rick was sorry that he would not be able to meet with us regularly, so thought it best to let someone else fill the position. The PFCC decided to continue functioning without a chairman. K4NTA announced that the FADCA Board of Directors had approved the PFCC to carry out FADCA's frequency coordinating responsibilites to its members and the Florida Repeater Council.

The list of digipeaters reported in last month's BEACON is the list that was sent to the ARRL by the PFCC for inclusion in the new Repeater Directory. It should be out by the Dayton Hamfest, and you can expect a lot of new packet listings across the country.

The PFCC approved a registration form for digipeaters and will be sending it out to all known trustees. It will be the basis of frequency coordination so everyone who currently operates or plans to operate a packet digipeater on any band should complete this form and return it to the PFCC. If you don't receive a form in the mail by April 5, write to the PFCC at 812 Childers Loop, Brandon, Fla. 33511.

K4AHO will be looking into what the other packet coordinating groups are doing across the country, and WB4KGY was appointed to be our liason to the Florida Repeater Council. The PFCC has received several requests for coordination of digipeaters on 6m, 220 Mhz, and 440 Mhz, and is working on those with the FRC. We should have some news on packet options for the other bands next month. Again, if you wish to request a coordinated frequency for your packet operation,the first step is to complete the PFCC registration form and return it.

The two meter frequency coordination plan presented last month was discussed at the Florida Network Coordinating Meeting in Orlando. There was significant negative feedback on the 85 mile co-channel separation rule, and the group recommended that the PFCC implement a 125 mile plan. K4GFG will complete a 125 mile plan and present it to the Committee as soon as possible. In the meanwhile, any suggestions or proposals from users will be welcome.

*****

COMMENTS ON FADCA NETWORKING

Jim Diggs, K4AHO

[Jim is a long-time packeteer in Orlando, and a FADCA director. He is no stranger to controversy, and he has submitted this article to foster some additional discussion on network planning. ed.]

We have seen over the last year many proposals for networking for the state of Florida. Some use parallel networks, others use high speed backbone networks on 220 Mhz. All proposals offered so far have steep startup cost and stringent RF equipment requirements. Perhaps there is no other way. This may explain why the networking seems to be moving slowly. I hope to offer some insight into a more practical means of networking, which will happen in stages and allow time to find ways to finance the more expensive systems needed in the future.

I have purposely delayed any changes to the ORL digipeater until I could reason out a way to accomplish the desired goal with the least effort and expense. I also wanted to wait until after the ARRL conference as I felt more information would be available on the packet switch program status. Unfortunately not much was learned directly but much was learned by inference (reading between the lines) in the conference papers published by the ARRL. First I was delighted to learn that the packet switch code had been ported to the TNC2 and was apparently working with only a few bugs. Nothing was learned about the future changes to the switch code, or any apparent timetable of those changes. This was a disappointment until I begin to understand the complexities of the problem as I read the Conference papers. I was suprised to learn of the large RAM memory requirements of the switch code. Also it is apparent that BOTH the TNC2 and Xerox 820 (with FAD board) are primitive switches without any routing code at all. With the 64K memory limitations of either machine there may not be room for a full blown packet switch on either the TNC2 or the Xerox 820. I believe any attempt to put two port packet switch code on the Xerox or the TNC2 is a waste of time. There is simply not enough memory. This being the case I believe our time would be better spent using the TNC2 with its battery backed, low power consumption circuitry as a simple packet switch,

 Continued on next page

single port, no routing, linked station ID forwarding system. The present memory can be easily expanded to equal the Xerox with the NEC 32K x 8 Static RAM. Presently this chip is expensive but rapidly falling in price. I was quoted a price of $67 each, with a purphase of two. The TNC2 is reliable and well suited for remote digipeator/ switch operation. A totally battery-backed switch is practical.

I believe a system of packet switches on 145.01 MHZ and a system of LAN frequencies (used for local chit-chat and local BBS use) would be a reasonable intermidate approach to networking for Florida. I also believe the next big programming effort should be porting the X.75 packet switch code to the TAPR NNC. This machine is the next best answer for switch memory requirements as it can address more than 64K memory in banks. Whether this would meet the memory requirements experience can only tell, but the SCSI interface can be used with a hard disk. The hard disk may make up for the shorcomings of bank switching and is more practical for remote operation than a floppy disk. This system should really be our goal rather than a two port Xerox. The hardware exist, is not terribly expensive, and ready for multiple port operation. The possibilties of expansion of the NNC are the best available at this time. The NNC is the best approach for networking in Florida for the next several years. Better hardware may come later but nothing appears on the horizon at this time.

With these thoughts in mind I offer the following plan by steps.

1. Establish the TNC2 as the standard switch hardware for the Florida networking system.
2. Finalize the present switch code for the TNC2 by taking advantage of the 32K memory expansion and adding the code to pass linking station identification.
3. Port the TNC2/XEROX code to the TAPR NNC and establish Beta test sites.
4. Add the routing and two port code to the NNC utilizing the bank switching memory expansion. This code should allow for remote uploading of routing tables.
5. Upgrade the standard Florida networking system hardware to the TAPR NNC.

This approach seems to leave the Xerox out in the cold. But consider this, the Xerox does not lend itself to battery backed operation. It is physically large and has questionable reliability. The addition of the FAD.PAD board certainally does not add to the reliability. The 64K memory limitation makes it use as an intelligent two port switch questionable at best. And using two ports would certainally preclude routing tables. The Xerox serves well as a development tool but not much else. The TNC2 certainly has some of the same limitations but can be battery backed and has good reliability. It is small and can directly replace TNC1s and GLB PKT1s. The immediate result of this approach is that we will have a packet switch backbone on 145.01 MHZ and will gain much experience with packet X.75 switching. If efforts are started immediately to port the present switch code to the TAPR NNC, perhaps some of the present Xerox switches can be traded out with NNCs rather than TNC2s as an intermediate step. As good sites are hard to come by and the networking system is short on redundant paths every machine is needed. The NNCs will make the addition of the second port on 220MHZ much easier and more reliable by step by step expansion of present sites. This proposal is certainally nothing new. It is only a review of the path we seem to be on by default. This path seems to lead away from the Xerox and to the TAPR NNC. I hope everyone can see the long term benefits of this path and stop resisting the NNC with the excuse of no software. It simply isn't true. Howie's switch code would do well on the NNC and give plenty of room for future expansion that we will so desperately need. Now is the time to stop waiting on further developments of the Xerox code and press on with the NNCs.

*****

Things go better with color ...

The TNC-2 is equipped with 5 red Light Emitting Diodes (LEDs) to let you monitor the TNC's status during your daily use. From right to left they are:

PWR (Power On - should be lit all the time!);
CON (Connect indicator - lit when a connect is in effect);
STA (Status of unacknowledged packets - lit when your TNC's transmit buffer contains unacknowledged packets);
PTT (Push To Talk indicator - lit when transmitter is keyed);
DCD (Data Carrier Detect - lit when signals are being received within the audio passband of the TNC modem).

Each of these is important for its own purpose. With the relatively short time constants involved in the traffic we participate in, it is useful to monitor these LEDs and to take appropriate action (change the TNC's command parameters) if the LEDs indicate an unnormal behavior. Like for instance during file transfers via a marginal link the STA LED may not extinguish between packets sent, which may lead to too many packets outstanding and 'death' to your file transfer.

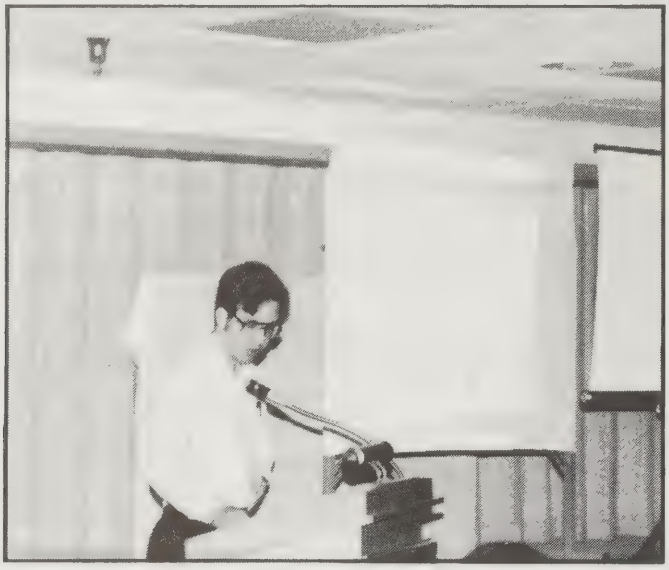
To have a better visual conception of what's going on I decided to add colors to my life:

RED PWR is OK for power-on indication.
The CON LED was replaced with a GREEN LED. The green color here is the logical choice to show that the connection is OK.
The STA LED is an important LED, indicating a status between go and no-go. YELLOW is the logical color for this LED if we stick to the traffic light analogy.
RED PTT LED is OK, it matches the red 'transmitter on' LED found on many transceivers.
GREEN DCD LED would be the matching color to the 'receiver busy' LED found on many transceivers.

The idea is free of charge ...73 de LA4LN,
Tom Victor Segalstad

Paul Rinaldo, W4RI, Opening the Fifth ARRL Amateur Radio Computer Networking Conference, March 9, 1986

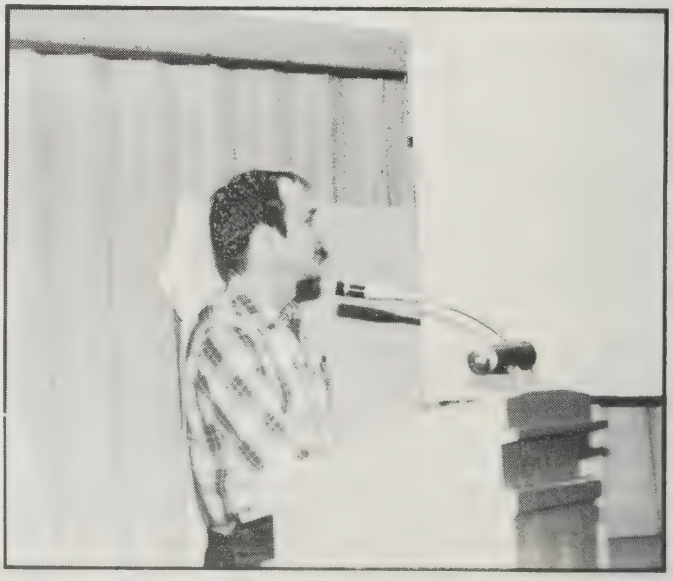
Fujio Yamashita, JS1UKR, presenting an Outline of Satellite JAS-1



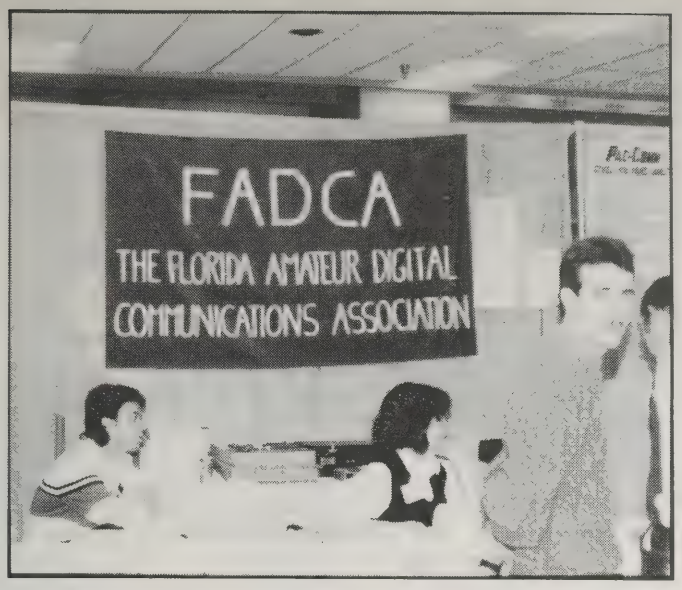
Phil Karn, KA9Q, describing the merits of TCP/IP for amateur networking

Hal Feinstein, WB3KDU, addressing the Conference on "Authentication of the Packet Radio Switch Control Link"

A Bearded Experimenter (Lyle Johnson, WA7GXD) discussing the TAPR Network Node Controller

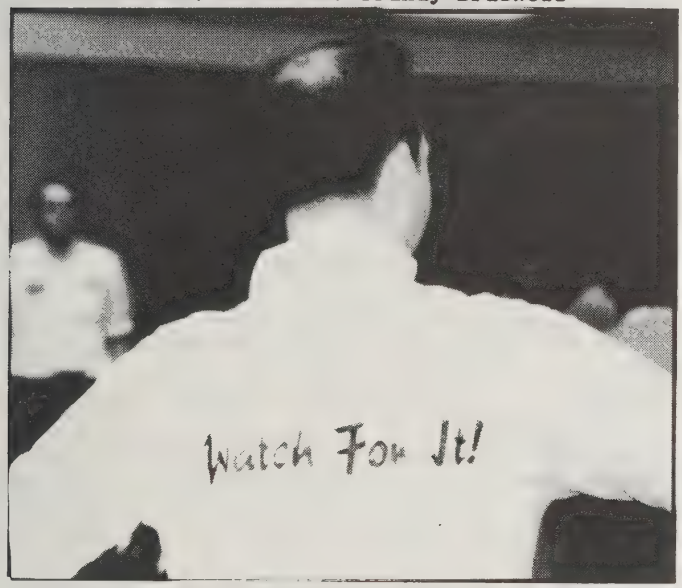


David Cheek, WA5MWD, Presenting his paper, "Automated Traffic Handling Assistance"



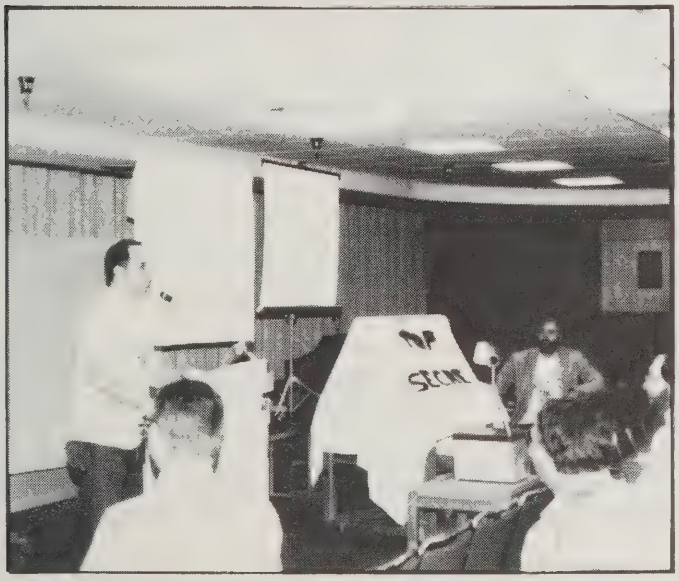
The FADCA booth manned by W1BEL's child laborers, Brian and Brandy Braswell

The TAPR Crew in their 'STEALTH TNC' Shirts



An inducement to watch for the 'Stealth TNC' (and a candid view of Pete Eaton's emerging dome)

Tom Moulton, W2VY, setting up a networking demonstration, watched by Ted Huf, K4NTA



The TOP SECRET TAPR Packet Operator Training Aid (Packet Pooper) prior to unveiling

Gwyn Reedy, W1BEL, speaking to the FADCA Membership Meeting

UTAH ACTIVITIES AND GROWTH
Dave Pedersen, N7BHC

Growth of Packet Radio in Utah has slown down considerably since the end of last year. This trend is going to reverse soon, and interest can be expected to increase in the near future. This is both good and bad!

Renewed interest is good because it will lead even more people to get active on this interesting mode of communications. It is safe to assume that this next group to get active on Packet Radio will be more of the 'user' type person rather than the 'bearded-experimenter' type. This is going to lead to more participants who are out to use Packet Radio to assist them in whatever aspect of amateur radio they are most involved in, rather than just use Packet for Packet's sake. In other words, they will view Packet as a 'means to an end', rather than as an 'end'.

What does this translate to? More use of packet by special interest groups, such as emergency communications or HF DXing groups. Visualize, if you will, an HF DX group having their own dedicated BBS. For example, when someone works or hears a DXpedition on Malpelo, he notes the particulars and operating habits that he observed of the DX station on the 'HFDX BBS'. Several hours later, another HF DXer checks into the BBS, and requests any information on 'Malpelo', sorted in any order he chooses to specify, which is then dumped to him.

Diversification of interests in a group such as UPRA is a good thing. It provides a much wider and more solid foundation to build upon. It maintains a positive growth because everybody will see a need for Packet Radio, and a use for it in their enjoyment of the entire hobby.

Another positive influence on the growth of Packet Radio in Utah is the fact that 1986 is the year in which we are going to reach to our neighbours. Once linked to California alone, the amount of available stations to work will increase by a factor of at least 10.

I said there was a negative side to this whole issue, and here it is. Where will all these people go? We have only five assigned frequencies on the two meter band in Utah, and in no time at all, they will be saturated. After they all become used to capacity, there is only one thing to do. Move!

Where to, you ask? We currently have several frequencies assigned on the 220 MHz band for both narrow and wide bandwidth signals. The wide bandwidth frequencies will also allow for higher data rates, which will also serve to improve channel efficiency.

This all costs money, because radios have to be procured that very few people have, and if higher speed is desired, that increases the cost even more. There is a low cost solution...the wide open spaces of 50 MHz. The six meter band is probably even more underused than 220 MHz, and simple radio equipment is available for under $50 per station (new)!

I am, of course, referring to the latest thing to hit the CB market; 49 MHz FM radios of various descriptions are now being sold for $30 or less each. Very little is needed to modify them for Packet use on the 50 MHz band; essentially just 2 new crystals, retuning and maybe a metal box to put them in. The whole principle has been used in the library of a Californian University for about a year now on 49 MHz, and a working 6m system was discussed at the TAPR meeting in February.

If we act now, we can get 25 or more channels assigned for Packet use on the 6 meter band, giving us room for growth at low cost, and also protecting the band from commercial interests.

See you soon on 6 meters?

*****

UPRA DATA

MEETINGS: Held at the Heathkit Store, at 7200 South State (58E.), on the second Thursday of the month at 7:30 PM. The next meeting will be on April 10th.
VOICE NET: The information dissemination and question/answer net is held on Tuesday evenings at 8.45 p.m. , on the 146.02/62 repeater. Net control is Steve, KI7L.
PBBS: There are several PBBS stations now in operation. WA7UZO and KA7EGQ are running the WA7MBL BBS systems with IBM PCs. WA7YAZ is on the air with an Apple based system. All stations are currently on 145.01 MHz.
MEMBERSHIP: UPRA membership dues are $15 annually. Additional family members sharing a newsletter pay only $1.00.
NEWSLETTER MATERIAL: This may be sent to the address listed below, or via several electronic routes, which are either ASCII text files on IBM formatted disks or via a BBS. Contact me via the phone number below for more information. Submission deadline is slowly creeping earlier each month...call for more info.

ADDRESS -	Utah Packet Radio Association
For all UPRA	4382 Cherryview Drive
business:	West Valley City, Utah 84120
	(801) 967-5896

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19.2K or 38.4 KILOBAUD ON THE TNC-2
Clint Turner, KA7OEI

After some experimentation, I have made the following "improvements" to my TNC2-A (rev. 2) and these modifications have yielded the following results:

a) Reduced RFI on HF & VHF
b) Faster data rates
c) More accurate DAYTIME clock
d) This message

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RMPRA > PACKET

A NEWSLETTER OF THE ROCKY MOUNTAIN PACKET RADIO ASSOCIATION

FROM THE ROCKIES:
Chris Kelly, WD5IBS
President, RMPRA

This month's Packet Radio Magazine begins the regular participation of the Rocky Mountain Packet Radio Association (RMPRA) monthly column. The RMPRA was formed in Colorado in 1984, and has grown to include over 150 members throughout New Mexico, Colorado and Wyoming, and recently West Texas.

Our membership is spread over about 250,000 square miles, and so we have a great challenge to serve all these packeteers with a single organization. For this reason, the RMPRA has taken several new directions this winter, aimed at connecting our many remote areas, and promoting development of local packet groups.

RMPRA is an "umbrella" organization, composed of many local cells of activity, but serving a wide area with information and coordination of packet planning and operation. To keep all our members in touch with both the regional and national issues of packet radio, we use both a regional quarterly newsletter, the RMPRA>PACKET, and PRM as a monthly publication sent to each of our members.

Packet radio depends on agreement and cooperation on subjects like protocols and other technical guidelines, bulletin board operation, digipeater linking, and higher level link design and far-reaching issues, and provides other "overhead" functions like newsletters. This frees the local groups, formal or informal, to pursue specific developments in their own areas, such as building a digipeater for a certain mountain, or putting a bulletin board on the air.

Through this column, we hope to inform the rest of the country of events and plans in the Rocky Mountain Region, and to establish the necessary links with other packeteers of various interests. These links will help all of us in setting directions on nationwide issues such as NTS packet traffic, HF packet connections, satellite packet use, and eventually, VHF/UHF terrestrial nationwide networks.

I want to thank our newsletter editor, Sam Selders, WOHJX, who has agreed to serve as editor for submissions from RMPRA to Packet Radio Magazine. If you have news or articles of a nature suited to publication in this column, or for the RMPRA>PACKET newsletter, please send them to Sam.

We look forward to hearing from the rest of the country as their organizations and plans progress, and to a fruitful future for packet radio.

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Note that some of these modifications (i.e. result #a above) are from other sources.

To reduce RFI I have noted that the use of bypass capacitors (0.01-0.1 uf) from each pin of the DIN connector to ground reduced the tendency of my TR7 to RESET my TNC when it was keyed up. Also, capacitors (about 0.1-0.47 uf) from pins 11 & 3 to ground and 0.01-0.04 uf to ground on U4 reduces "birdies". I have noticed far better results with disk-ceramic capacitors than with mica or mylar capacitors. The use of a shielded RS-232C cable, and having the cable from J2 (the DIN connector) wound several times through a large toroid as close to the TNC as possible also helps reduce RFI.

Also noticed was that the CMOS Z80A and other related components functioned flawlessly even after JMP2 was changed from its default of 2.4576 Mhz to a CPU clock rate of 4.9152 Mhz resulting in a DAYTIME clock accurate to within 1 sec/day (with CLKADJ at 0) and the TNC being able to handle faster data rates.

The accuracy of the DAYTIME clock at this point is mainly limited to the netting of the 4.9152 Mhz crystal which, when properly adjusted for accurate time anyway, should not harmonically interfere with 145.01 Mhz packet operation.

Now for the HIGH SPEED modifications. This will allow 19.2K baud operation of the TNC when all of the RADIO and/or TERMINAL baud rate select switches are opened.

a) connect pin 6 of U4a to pin 27 of U27 through a 2K ohm resistor.

b) sever ground foil of one of unused gate inputs of U9 or U7 (pin 1 of U7, for example) and connect pin 1 of U7 to pin 6 of U4a, and connect pin 2 of U7 to pin 11 of U10e through a 2K ohm resistor. Do NOT use U14 for this as it is battery-backed up!!! Doing so will shorten battery life. (If you wanted 38.4K baud operation, then use pin 5 of U4a instead of pin 6.)

I have noted NO deterioration in performance due to these mods.

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Next month in PRM look for an article on an advanced technology enviromental conditioning device to support the TAPR LSC-10 Packet Accessory. Complete technical data will be provided.

Also there will be an article on the first known packet radio mobile operation from a steam powered railroad train, software reviews, more local news, etc.

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SOUTHNET REPORT
Eric Ellison, N4CI

PLEASE YOU SOUTHNET GUYS IN OTHER STATES, WRITE YOUR UPDATES FOR THE PRM. WE NEED TO KNOW WHAT IS GOING ON AND THE INFORMATION IS IMPORTANT!!!

The SOUTHNET Conference at the recent Orlando Ham-cation kinda got a bit lost in the shuffle of the hamfest and the ARRL Networking Conference. You can only do so much in one weekend. Thanks to Gwyn, W1BEL, for providing a room for SOUTHNET. The networking conference was the first that I have attended and I finally put faces to all those famous calls that I have been seeing on DR-NET. I hope we can announce another SOUTHNET meeting for this fall, perhaps in Alabama or Mississippi or South Carolina. With air fares the way they are, we may all be able to fly to the conference. How about Gulfport?

In spite of not meeting formally as the SOUTHNET Committee, the organization of the region will become more important as we come closer to a higher order networking solution. In the meantime, informal contacts made at Orlando by folks well represented by Georgia, South Carolina, and Florida did manage to update state activity. I hope other SOUTHNET Committee members will write reports for this column in months to come.

Georgia Update:
Georgia is perking along great on the interim networking plan announced at SOUTHNET II in November. The problem is time and money (so what else is new?) The RLI forwarding systems are working fine in the LANs that have been established. The problem on 145.01 seems to be solved for the moment as folks migrated rapidly to LANs off of the trunk frequency. The sites at Valdosta and Macon need some firming-up, but otherwise we have almost a 100% path. Thanks to Scott, KF4TT, and company in Gainesville, FL, we have the much needed site in Lake City, FL. Scott, the day is near when we will pump lotsa store and forward traffic thru you to all parts of Florida and back. Thanks for the hard work. For a few weeks when the path was reliable and solid, traffic went from Tennessee, South Carolina, and Georgia all the way to Orlando. Due to lesser packet activity in the Savannah and Augusta areas we do not have RLI coverage there. However, primary LANS have been established. Folks in those areas, if you read this, GRAPES may be able to help with a system in the near future when we solidify the 145.01 trunk. Macon is about 90% complete with their system, but do not have it installed. We have need of only about 2 or 3 more 145.01 digis in the state, and then we can begin to optimize the whold system. One needed digi is being installed on a 2000ft tower just north of Albany, and one is needed in the Milledgeville area to bring the Augusta guys into the net. A third may be needed in the Southeast portion of the state to accommodate Savannah when they come on line.

Georgia LAN Progress:

METRO-LAN (Atlanta) KF4JJ-1 145.03
On or before March 29th, the METRO LAN will probably be on stream on 145.03. This was called for in the Networking Plan but is not yet implemented. Dave, KA4IAR, John, KF4JJ, and I are working furiously to meet the deadline. The proposed site is at the 950 foot level on the WXIA transmitter tower in Decauter, GA. Thanks to KE4ZV for securing the site. Chris, KA4OVX, Dennis, WB4GQX, and I scoured the Orlando hamfest for parts, and we found everything needed. We should have an RLI system working by the time the digi is installed. We can install two more digis to accommodate this LAN and good locations would probably be LaGrange and Madison. This would give optimum coverage for the area designated in the networking agreement. WA4TXT-1, currently on 145.01 in Hampton, GA, may be put into Atlanta LAN service when WB4GQX-2 on 145.01 in Forsyth, GA is brought up in power. This should be welcome news for the folks in Griffin, GA.

ATLANTA LAN (Atlanta) KD4NC-1 145.13/73, BBS WA4VMV
There were apparently some problems with the Atlanta LAN digi for a few months, but Doug, KD4NC, seems to have the system working fine now.

SAPS LAN (Tifton) 145.13/73
Wayne, WD4LYV, reports that the guys in South Georgia are snug as a bug in a rug on 13/73. Larry, KF4JF, has transferred the RLI system formerly on HF to Wayne for that LAN's use. Wayne proposes that we use mnemonic callsigns for BBS and put the call of the SYSOP in the Beacon text or HID text for station ID purposes. This is similar to the Florida GATOR area code/airport identifier scheme, and has some very, very strong benefits. For example, Wayne's board would be SAP, the METRO LAN board would be MET, Atlanta LAN would use ATL, etc. Mnemonics are easier to learn for humans, and routing tables would be more consistent over a long period of time for automatic forwarding. We are not suggesting this system for the 145.01 trunk system where future routing menmonics will be used, but only for local BBS links. Let Wayne or me know what you think.

SOUTH GEORGIA LAN (Albany) 145.09
The Albany group is busy installing the SGL LAN on 145.09. This machine has been testing on 145.09 from the 2000 ft tower in North Albany (Parrot, GA).

MIDDLE GEORGIA LAN (Macon) K4ICT-1 145.03
Frank, K4ICT, has been very busy making a living, so there has been some delay getting a planned digi on 145.01 in the Cordelle, GA area. And the RLI system is about 90% complete, and not yet on the air. Sometimes earning a living gets in the way of having fun.

NORTH GEORGIA LAN 145.09 WB4GQX-3 & -4, AA4EO-1, BBS W4KAU
This was the first Simplex LAN to move off 145.01 and is serving 60 to 70 users very well. Dennis, WB4GQX, is experimenting with simulcasting to allow

 Continued on next page

Networking In New Jersey

* The Radio Amateur Telecommunications Society *
************ Information Bulletin ************
************** 12 March 1986 *****************
****** LEVEL THREE NETWORKING IS HERE ! ******

The N2DSY-2 digipeater in Little Falls, New Jersey has been converted to an X.25 packet switch. The switch callsign is now "N2DSY-3". The switch is used by all users by simply typing:

C N2DSY-3 (ret).

The switch will then be connected to you. You respond by sending a carriage return. The switch will give you a banner. At this banner and prompt type the callsign of the desired station and an address. The format for this is given by the switch in the prompt and looks like:

W2PAT @03100201100 (ret).

What the switch will do is locally acknowledge your packets and send them on to the next hop. This is especially handy when the channel is crowded.

The old digipeater address of "N2DSY-2" still works and it will continue as long as is required.

This switch runs software written for the TNC-2 family by Howie, N2WX.

In this early version there are five links supported, each with up to five VIRTUAL CIRCUITS.

The code is the first release and should be considered as a beta-version. Please report any problems to:

The Radio Amateur Telecommunications Society
206 North Vivyen Street
Bergenfield, NJ 07621

They will be analyzed and forwarded in summary form to Howie.

Thanks for your help during this exciting time !

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Continued from previous page

real time connects from .01 to .09 on WB4GQX-4. This crude dual port digipeater works well, especially for those stations that must use one of the high site trunk digipeaters. These LAN members understand the MailBox and forwarding operations well and confirm the greater ease of education in a smaller LAN.

EAST GEORGIA LAN (Augusta) 144.99 No Report.
WEST GEORGIA LAN (Columbus) 145.07 No Report.
SOUTHEAST GEORGIA LAN (Savannah) 145.07 No Rpt.

Well, that's it for now. The interim GA network using "WORLI NNCs" is working splendidly, and except for a few jokers that put high volume servers on 145.01 briefly, everyone seems to be complying with the networking plan. 145.01 is reserved for digi DXing and other human fun from 5 PM to 1 AM and 6 AM to 9 AM daily. The BBSs are forwarding traffic at other times.

*****

What's In A Layer

NOW THAT WE HAVE LEVELS 3 AND 4 LETS MOVE ON
Phil R. Karn, KA9Q

My TCP, as a "layer 4" protocol, is up and running. It implements the full-blown ARPA TCP spec as described in RFC-793 and MIL-STD-1778 with two exceptions: security (which I assume we have no use for) and urgent data (which I can't figure out how to use, although it wouldn't be hard to add). Other than that, there was no reason to change the spec to suit our needs, with the result that my implementation is fully compatible (and has been tested with) the various other implementations out on the Internet. I hereby toss it out on the table for consideration as our end-to-end Transport protocol. There is no reason to "roll our own", thus adding to the layer 4-5-6-7 confusion. I've reworked the programming interface to make the facility more general; there are now optional "upcalls" (also known as "pseudo interrupts" for transmit buffer availability and connection state change as well as receive data availability.

The ARPA Internet has no need for a distinct session layer (level 5); its few functions are assumed by the "well known port" concept in TCP (and UDP). As for presentation layers, this depends on the application. Since remote login is likely to be an important initial application, I'd like to suggest that we consider the ARPA TELNET protocol. This is a simple, extensible technique where various options (e.g., which end of a connection is to perform character echoing) can be negotiated. For example, a user connecting into a UNIX system (which conventionally operates in "full duplex" mode with per-character transmissions and remote echoing, to allow use of fancy command line and screen text editors) will receive a WILL ECHO offer from the host. Your Telnet, which is under your control, can respond with either a DO ECHO or a DON'T ECHO command, which either accepts or rejects the remote host's offer. Many other options exist, including ones to control the faucets on the kitchen sink, but only a small set (about 5) are actually recommended for use and only one or two (echo being the most important) are actually used widely. The mechanism is there, however, for other options to be implemented, and their use can be negotiated with other systems as needed.

Other presentation level protocols of interest include the FTP (File Transfer Protocol) and the SMTP (Simple Mail Transfer Protocol) with self-evident uses. SMTP really is simple to implement, as there are only about 5 commands. FTP is quite a bit more complicated, since it is one of the oldest commands in the ARPANET (long predating TCP/IP and about as old as TELNET), and although it is widespread there may be simpler alternatives. I would like people to look at SMTP, however, since it represents a much "cleaner" way to transfer mail messages than the current highly ad-hoc of linked WORLI bulletin boards. I can provide documents on these protocols, along with sample sessions, if there is interest.

*****

A Proposed Level 3 Routing Algorithm

Lynn W. Taylor, WB6UUT

Yea, from the table of my memory
I'll wipe away all trivial fond records.
-- Hamlet (Act I, Scene 5, line 98)

According to the ISO Open Systems Interconnect model, the network controllers are responsible for the first three of the seven protocol layers in a packet switched network. Layer 1, the Physical level, is responsible for the physical aspects of communication (radios, modems, HDLC, baud rates). Layer 2, the Data Link level, is responsible for taking the physical medium and making it error-free, and dividing it up among the users. The third layer, called the Network, or Communications Subnet level determines the host-subnet interface and how packets are routed in the subnet. Levels 4 through 7 deal with issues that are beyond the scope of this paper.

Routing is one of the key issues when defining a Communications Subnet Level protocol. The various routing algorithms can be divided into two categories, centralized (where some central station must know or discover the network topology, and serve as a clearinghouse for routing) and decentralized (where each TNC can handle at least part of the routing task). Centralized algorithms must be designed to recover when the master station crashes, and each station must know how to reach the router itself. Decentralized algorithms require each station to know how to pass traffic to other stations in the net; to accomplish this, the TNC needs to find out something about the nework topology.

I am going to discuss two specific routing algorithms, the advantages and drawbacks of each, and why I believe we should select a decentralized algorithm for Amateur use. None of this material is original, and most is discussed at some length in the computer science literature. Some of the combinations of this information are new, particularly as they relate to the specific problems of Amateur usage.

The first algorithm has a couple of advantages, and one major disadvantage. This algorithm does not require any special knowlege of the network topology, other than a list of stations that the TNC can hear. When the TNC receives a packet addressed to someone other than itself, it simply passes it on to everyone it can hear except the station it received it from. The algorithm is appropriately called Flooding.

Flooding is easy to understand, and easy to implement. The problem comes when the load on the network increases. Since each packet will pass through every single node in the network, and many of them more than once, the amount of traffic generated by simply saying "Hi" can be staggering. Also, steps must be taken to prevent packets from looping forever through the network. The simplest case of this is a 4 station net (A, B, C and D) where all 4 stations can hear each other. If A originates a packet for D, it passes it to all 3 stations it can hear. B passes it to both C and D, where D accepts it, and C passes it to A and D. D has already got the packet and ignores the duplicate, while A passes it to B and D. Again, D discards it, and B passes it around. At the same time, packets are flowing in the opposite direction around the same loop. While this simple case could be easily fixed, it becomes more complex in a larger net. One solution is to limit the life of any given packet to a certain number of hops, but this still generates a lot of unnecessary traffic.

A better algorithm would require each TNC to have a table giving the address of each node in the network, some measure of the distance to that station, and the address of the next station along a path to that station. A hypothetical 5 station net, and each node's tables is shown below:

```
A  <--->  B  <--->  C  <--->  D  <--->  E

B 1 B     A 1 A     A 2 B     A 3 C     A 4 D
C 2 B     C 1 C     B 1 B     B 2 C     B 3 D
D 3 B     D 2 C     D 1 D     C 1 C     C 2 D
E 4 B     E 3 C     E 2 D     E 1 E     D 1 D
```

In this example, the available communications paths are shown by arrows (i.e. A cannot communicate directly with C). Note that each station knows how far away all the other stations are, and who is the next station in the chain. If A wants to talk to D, A knows to pass traffic to D, and it will take 3 hops to get there. It is up to B to know who to pass these packets on to.

The problem with this method is easy to see -- where do these tables come from? In the proposed WestNet protocol, which defines a long-haul network for linking geographically seperated LANs, a similar algorithm is used which assumes all nodes internal to the network will stay on. In other words, this network is static (because all the nodes are dedicated devices to be installed on mountaintops). In a local network, stations (nodes) tend to appear and disappear frequently.

In a dynamic network, the answer to the question must be "from the network itself." This further divides into two problems: how does a new station get its initial table, and how do we make sure the table each node has is up to date. To clarify this problem, lets add station F to our earlier network:

```
A  <--->  B  <--->  C  <--->  D  <--->  E
          ^                            ^
          |                            |
          ------------> F <-------------
```

In this example, A should now pass traffic for E through F, while traffic for D can follow its previous route, or as efficiently through E and F. If all stations listen for new stations on the air, and F comes on and sends an "I'm here" (or CQ) packet, A and E can detect F's presence, connect with F to make sure they can communicate, and pass copies of their routing tables. By taking the best information from both tables, F can build its initial table:

Continued on page 18

MARDA

The Official Newsletter of the

MONITOR

Mississippi Amateur Radio Digital Assn

Patrick J. Fagan WA5DVV
2412 E. Birch Dr., Gulfport, MS 39503
Compuserve ID: 74246,1310

BBS/TECH LIBRARY:
Now that Hank, WORLI has released his last PBBS update with version 11.2, it makes one think about what project he is planning next. I am running 10.0 here but understand the most recent offering is a work of art.

Here in Mississippi the BBS network is still in its fledgling stages. It was just recently that I had the opportunity to forward MAIL to another BBS (WB4RHO) automatically. Glynn in Headland, AL got his WORLI system up and running and requested that I add his BBS to my forwarding list. Forwarding list? I didn't have one so....it was off to the SYSOP manual where I undertook a crash course in how to set up routing tables.

To the older BBS operators who have been forwarding mail back and forth, this is no big deal...but...to see the system work for the first time is a real treat. Right now WA5DVV forwards mail at 13 minutes past each hour. The only WORLI BBS in reach is about 200 miles east of Gulfport. Even through multiple DIGI's, reliability is not the best.

The MAIL forwarding system within the state is very limited. Alan, WD5IKD, in Pearl (near Jackson) has a BBS on a CoCo but it doesn't have forwarding capability at this time. Bill, WB5SXK, in Vicksburg is running a BBS on a Model 1 and the same story holds true in his neck of the woods. Both of these SYSOPs hope to get a compatible system on the air in the future.

During a recent EYEBALL QSO with Fred, KE5SJ, an interesting idea emerged. The WA5DVV PBBS is constantly running out of disk space. Even with three drives I still have to purge old files at least once per week. Hopefully someone will find a way to install a hard drive on an 820 to relieve this problem. In the interim let us ponder this thought.

Over the past few months PACKET RADIO has grown by leaps and bounds, with technology changing faster than ever. The SYSOPS try to keep the DataBase areas of their BBSs stocked with info on these discoveries. The new PACKETEERS can't get enough of this when first coming on board. It is a shame that a lot of the great ideas get removed from the BOARDS before everybody has a chance to read them. Since disk space is the limiting factor on how many files can be on line at a time, a directory could be written that lists all files available in the LAN. Because so many different computers are being used on packet, this data could be spread around to those stations that would maintain the machine specific programs. Others that have large 30 Meg hard drives could store the older copies of GateWay, etc. The most recent issues still would be found in the DataBase area of the local BBS, whereas the archive copies and older files would be located elsewhere in the LAN. Think of it as a Main technical library and its branches. We will be trying this system out in the Gulf Coast LAN to see if it is feasi?ble. More on that plan after it has been implemented.

MARDA MEETING:
The 1986 Capitol City HamFest and Mississippi State ARRL Convention will be held in Jackson on April 19 and 20. MARDA will have a table with an operating (don't tell Murphy) Packet Demo on display. At 2:00 PM on Saturday, April 19th, there will be a combined VHF/Oscar/AMSAT/Packet forum. I will be looking forward to meeting everyone there.

MODEL 100 MAILBOX:
Here is an interesting little idea for Model 100 users. If you have been thinking of setting up a portable packet station, have I got a deal for you. Now you can take this setup one step further by installing your very own PPPMS (Portable Packet Personal MailBox System). This little program was written by J. R. Hanna. Currently, version 1.1 has been modified by Karl Geng, N1DL to run on TAPR TNC2s and work-a-likes as well as the Kantronics series of TNCs. DOC and uploading was made possible by Dick Roux, N1AED. It allows the connecting station to leave a message for you, page the SYSOP for a chat and then disconnect. When you return, a file of messages with time/date info (provided CONSTAMP was ON) has been left on the Model 100. The program is in Basic so it can be customized very easily to say anything you wish in the connect message. Look for it on Compuserve's HamNet in Data Library 9. The DOC, TNC2/2A/200/PK80 and Kantronics versions of the program are all in one file called AUTOSY.100. Once downloaded, all you have to do is edit the portion of the listing you need for your TNC, load the programs into your M100 and connect away. Oh, incidentally, it has a terminal mode built in so you can go on line for a live QSO with one keystroke. A lot of the stations in the area are using this program and have found it to be a neat addition to their packet operating enjoyment. Try it - You'll like it. [look for it in the April PRM. ed]

Until next month, may all your CONNECTS be many and RETRIES few.

*****

```
A 1 A
B 2 A
C 3 E
D 2 E
E 1 E
```

There are two equally good paths from F to C (through E and D, and through A and B), F selects these at random.

Also, the rest of the net need to be told about the new network topology. First, A (and simultaneously, E) tells everyone it can hear that F is one hop away from it. B checks its routing tables, decides that this is good news, and passes the news along to everyone it can hear, etc. This is the flooding algorithm again, with a twist; stations only pass on good news, so if a station already has a path of length N, it only passes on news of a path of N-1. In other words, when B announces to A and C that "I'm 2 hops from F", C is glad to hear, while A could care less, since A is only 1 from F, while C didn't even know F existed. C will wind picking the first path to F it hears about, since it has 2 paths of length 3 to F. This also means that C might use a different path to F than F would use to C; this does not matter since each have the same length.

F would also pass on the news of its complete routing table, since the whole table is news to it. This way, A learns of the new path through F to E and E learns about its new paths. The new tables would look like this:

```
B 1 B   A 1 A   A 2 B   A 3 A   A 2 F
C 2 B   C 1 C   B 1 B   B 2 C   B 3 D
D 3 B   D 2 C   D 1 D   C 1 C   C 2 D
E 2 F   E 3 C   E 2 D   E 1 E   D 1 D
F 1 F   F 2 A   F 3 A   F 2 E   F 1 F
```

```
A <---> B <---> C <---> D <---> E
^                               ^
|                               |
 -------------> F <-------------
```

```
A 1 A
B 2 A
C 3 E
D 2 E
E 1 E
```

Adding a node to the network is easy compared to what happens when a node leaves the net. Having a node tell the net its leaving is impractical, because that node may not be able to tell the net because of hardware failures, power failures, or propogation changes. One solution would be for a node to report to the rest of the net that node X is unreachable whenever it can't pass traffic on to X. This bad news would be passed through the net until it reaches X, which would then tell those stations it can still reach that it is indeed still reachable, generating a new set of entries in the network tables.

As an example, A is passing traffic for E through F when F goes off the air. A, realizing that it can't pass traffic through F announces to B that E is unreachable. B passes this news to C, who passes on to D, and eventually to E. At this point, E has been erased from everyone's routing tables. E would then tell D "I'm still accessable", D reports to C that "E is still 1 hop from me", and the good news passes through the net (and contradicts any bad news still circulating). A may now use the longer path through B, C and D, and the network has recovered from the loss of the path to E through F.

The problem of updating the routing tables is the most serious drawback of this algorithm, and I am not suggesting that the method I have explained above is the best. In Computer Networks by Andrew Tannenbaum, he points out that "good news travels fast" while bad news may take awhile to propogate through the network, especially where looped paths exist. By completely eliminating a station from the network tables and re-inserting it, many of these kinds of problems may be avoided.

I have explained two decentralized routing algorithms. These algorithms allow the nodes themselves, on an equal basis, to decide how to route data in the net, and dynamically alter the routing when the network composition changes. What are the problems involved in a centralized algorithm?

Centralized algorithms require a single station to have complete knowlege of the network. To do this, the master station must probe the network, and pass on its discoveries to the rest of the net. The master must either be a unique station type, or, in a homogeneous network, a station must be selected to be the master. A new station, when it comes on the air, must be able to tell the master it is on, and, if it can't reach a master, would most likely become one. Problems exist, in the case of two networks "growing" together (more than one master), and when the master fails. Depending on the implementation, a network may continue to operate without the master based on old information the master distributed, or collapse when the master disappears. Either solution would be undesirable.

I have shown that a properly designed decentralized system will not suffer unduly from the loss of any single critical station, and recover from the loss of any node in a reasonable manner. Centralized systems rely on the master station discovering the complete network topology, finding changes due to propogation, etc. and distributing this info. Since Amateur packet nets are very dynamic, it is probable that the master will be lost, causing the net to crash, or continue on without any direction.

While I feel the decentralized approach is best, the possibility of reasonable mechanisms for operating centralized networks, hybrid networks, rings, token passing schemes, and other are all worth investigating. My main purpose is to serve as a catalyst for further discussion.

*****

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PACKET RADIO MAGAZINE

The Florida Amateur Digital Communications Association
812 Childers Loop
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The TAPR TNC-2 prize in the FADCA membership contest was awarded to the Boca Raton IBM Radio Club. The Boca club was nice enough to defray a portion of the cost of the prize TNC, thus limiting the shock to the FADCA treasury. There were only five participants in the contest. Ted Huf, K4NTA, enrolled the greatest number of new members, but was well below the number required for the award of the p;rize. A total of (only) 25 new members joined as a result of the contest, so do not look for a repeat next year.

*****

The FADCA Software Library

A new item in the FADCA Software Library is a nice terminal program for the TRS-80 Model 3 and 4 computers called PACK-E-TERM 2.0 by Chuck Harrington, WA4GPF. It has some nice features including triple split screen. It works great with a TAPR TNC-1 according to the author.

Other new entries in the library include the Wake Digital Communications Group Packet Terminal Program, Version 2.03 with XPACKET binary transfer protocol for the IBM PC family, and the WA7MBL MailBox code for that same computer which is compatible with the WORLI system.

Please be sure to include a diskette or two, a return mailer, and return postage when you request software. A dollar or two to defray expenses would also be appreciated.

FADCA Software Exchange
% Howard Fisher, N4XPU
3191 Willow Road
Wimauma, FL 33598

Model 100 Terminal Program for the GLB PK1.
Continued

```
270 IF A$=CHR$(24) THEN B$="":PRINT:GOTO 210:' CTRL-
    X CANCEL BUFFER
280 IF A$=CHR$(8) THEN PRINT CHR$(32);CHR$(8);:'
    BACKSPACE CLEANUP
290 B$=B$+A$:GOTO 210
300 ' TRANSMIT IT
310 PRINT#1,B$;:B$=""
320 FOR I=1 TO 100 : NEXT:' COOL IT A MOMENT
330 PRINT#1,CHR$(10);:PRINT:RETURN
400 ' RS-232 PORT INPUT
410 C$=INPUT$ (1,2)
420 IF C$=CHR$(13) THEN C$=C$+CHR$(13):' MORE SCREEN
    HOUSEKEEPING
430 PRINT C$;
440 RETURN
500 PRINT#1,CHR$(13);:GOSUB 600: 'GLB INITALIZE
    BAUD, ETC.
510 PRINT#1,"S";:GOSUB 600:' DISABLE ECHO
520 PRINT#1,"E";:GOSUB 600
530 PRINT#1,"D";:GOSUB 600
540 PRINT#1,"SC";:GOSUB 600
550 PRINT#1,"K5JB ";:GOSUB 600:GOSUB 600:' CHANGE TO
    SUIT...NOTE SPACE
560 PRINT#1,"1 ";:GOSUB 600: ' SSID...NOTE SPACE
570 PRINT"(ENTER DESTINATION CALL)":  ' A REMINDER
580 RETURN
600 FOR I=1 TO 400:NEXT:RETURN:        ' TIME DELAY
700 PRINT"DISC":PRINT#1,CHR$(3):RETURN:  ' SENT HERE
    BY FUNC. KEY 8
800 ' DISPLAY COMMANDS - FUNCTION KEY 7
820 PRINT TAB(9);"GLB PK1 PACKET TERMINAL
830 PRINT TAB(4);"F-1: ENTER EDIT,     F-2: XMIT
840 PRINT TAB(1);"CTRL-X: SCRUB ENTRY  CTRL-D;
    REDISPLAY
850 PRINT TAB(4);"ESC: EXIT EDIT ESC-ESC: COMMAND
860 PRINT TAB(4);"F-7: DISP COMMANDS F-8:
    DISC.":PRINT
870 RETURN
```

*****

GLB TNC2A PACKET CONTROLLER

GLB Electronics - the first commercial producer of packet controllers joins the "TAPR Revolution" to bring you the GLB Model TNC2A Kit. This kit is the latest TAPR design and is supplied with top quality components. The GLB TNC2A is backed by over 14 years of experience in amateur radio kit products and our technical staff is available to assist you daily from 1 to 3 PM Eastern time.

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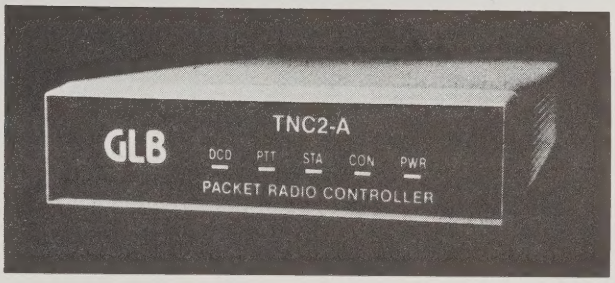

Hardware
Software
Documentation
} by TAPR

SPECIFICATIONS

CPU - Z80A microprocessor
Clock - 2.4576 Mhz standard, 4.9152 Mhz available
Memory - 32K EPROM, 16K RAM standard
HDLC - Packets are controlled by hardware for maximum performance permitting full duplex operation
Modem - 1200 baud, Bell 202 compatible (standard) easily configured for 300 baud/200 Hz shift for HF use
Serial - Computer/Terminal port is industry standard RS-232-C compatible for use with most equipment
Radio - Watchdog timer for channel protection transmits audio levels adjustable for nearly any radio. Wide dynamic range demodulator. Channel busy input (RF-DCD) to inhibit packet transmissions on a shared channel.
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Status - tells you when you have unacknowledged traffic in your buffers
Connect - tells you when you are in the error-free mode
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shown with enhanced
HFM-64 option installed

★ MORSE ★ BAUDOT ★ ASCII ★ AMTOR ★ PACKET ★

FIRST FIVE MODE DATA CONTROLLER

The Pakratt model PK-64 by AEA is the world's first computer interface that offers Morse, Baudot, ASCII, AMTOR *and* Packet all in one box (hardware *and* software included) at a price many competitors charge for Packet alone (from $219.95 Amateur net). Do not let the low price fool you; coming from any other company but AEA it WOULD be too good to be true. The PK-64 works with virtually any voice transceiver. The Pakratt is the easiest of any to hook up and have operating in just a few minutes.

In Packet mode, the PK-64 offers virtually all the features of every other Packet controller on the market, plus many important features left out by others due to cost constraints. For example, we have included a hardware HDLC, true Data Carrier Detect (DCD), multiple connect with up to ten stations simultaneously and full implementation of version 2.0 of the AX.25 protocol.

Because the PK-64 was designed specifically for the Commodore 64 (or C-128 and SX-64) computer, we have been able to do many things not economically feasible with general RS-232 interface controllers. For example, the Pakratt includes true split screen operation with on-screen status indicators and an on-screen tuning indicator.

ENHANCED HFM-64 MODEM OPTION

The standard PK-64 will operate all modes with a phase-lock-loop (PLL) detector roughly equivalent to all popular packet modems in the marketplace (except we have included extra filtering). The enhanced HFM-64 modem option offers true independent dual channel filtering with A.M. detection (like the famous CP-100 Computer Patch™). The enhanced HFM-64 option also offers a hardware LED tuning indicator (like the CP-100) and a front panel variable threshold control for setting maximum sensitivity under various band conditions. We recommend the HFM-64 option for anyone keenly interested in weak-signal heavy-QRM HF operation. For anyone desiring to operate FM RTTY with the standard North American tone pair or CW receive, the HFM-64 is required. The HFM-64 is field installable with no soldering or test equipment required.

WORKS WITH THE POPULAR C-64 COMPUTER

AEA designed the PK-64 around the low-cost C-64 because of the special architecture features making it especially suited to Amateur Radio applications. The C-64 should not be viewed as a mainframe, but rather a very economical accessory to your data communications system. Many owners of expensive computers such as IBM, TANDY, APPLE, KAYPRO, ATARI, etc., are now buying the low cost C-64 and dedicating it to their operating position. They simply cannot find software for their machine that even approaches the power and user friendliness of the PK-64. Plus, think of the convenience of having only one controller and keyboard to go from one mode to another without having to redo cabling!

The PK-64 is so complete that all you need to do is wire up a microphone connector to the end of a cable (provided) and you are ready to go. There is no need to track down special terminal software, cabling or even a power supply. It all comes with the PK-64. So do not be the last on your block to own the most exciting new product in years. See the PK-64 at your favorite dealer or write for our specification sheet now.

Prices And Specifications Subject To Change Without Notice Or Obligation

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AEA Brings you the Breakthrough!